

## Chapter 5: Spring Wheat Planting Guide



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The first step in maximizing profitability is selecting the best cultivar and planting at the appropriate rate, date, and time. The purpose of this chapter is to provide spring wheat planting guidelines.

### Planting Rules of Thumb

- Beat the heat.
- Plant by the 3rd week in April.
- Calibrate the planter and check planter accuracy.
- Use high quality seed.

### Seeding dates

Suggested and historical spring wheat seeding dates for the different regions in South Dakota are provided in Table 5.1. Seeding dates listed in the “Desired range” column are our best estimate.

A spring wheat planting date rule of thumb is to “beat the heat.” Wheat is a cool-season crop that does best under moderate, as opposed to high temperatures. Generally, the use of relatively early maturing varieties that are seeded in the desired range will generate the best opportunity for a good crop. The selection of early maturing varieties that are planted in April will enable the bulk of the crop to be produced before the high temperatures typically observed between mid-July to mid-August.

To beat the heat, spring wheat planting should be seeded during the first three weeks of April. If the soil temperatures permit (34-36° F), and if the 30-day forecast is favorable (temperatures greater than freezing), consider planting earlier. Planting after May 10 is not recommended because average or higher temperatures can reduce yields and quality. However, if temperatures are cooler than average, planting after May 10 can produce a “good” crop.

**Table 5.1. Suggested and historical spring wheat seeding dates for the 9 South Dakota regions.**

Approximate spring wheat seeding dates by region						
Suggested seeding dates*			Historical acres seeded, 1970 – 94 <sup>1,2</sup>			
Earliest	Latest	Desired range	10%	50%	90%	Reporting District
Apr. 3	May 24	Apr. 8-27	Apr. 10	Apr. 27	May 19	NW
Apr. 2	May 20	Apr. 8-27	Apr. 9	Apr. 26	May 12	NC
Apr. 1	May 20	Apr. 8-27	Apr. 8	Apr. 26	May 15	NE
Apr. 1	May 15	Apr. 5-22	Apr. 1	Apr. 20	May 13	WC
Apr. 1	May 15	Apr. 5-22	Apr. 1	Apr. 20	May 8	C
Apr. 1	May 15	Apr. 5-22	Apr. 1	Apr. 20	May 11	EC
Apr. 1	May 15	Apr. 1-18	Apr. 7	Apr. 24	May 13	SW
Mar. 25	May 10	Mar. 25-Apr. 15	Apr. 1	Apr. 17	May 9	SC
Mar. 25	May 10	Mar. 25-Apr. 10	Apr. 1	Apr. 16	May 11	SE

<sup>1</sup> South Dakota field crops—planting to harvest. 1979. South Dakota Agricultural Statistics Service.

<sup>2</sup> South Dakota—seeding to harvest. September 1995. South Dakota Agricultural Statistics Service.

Since the 1970s, the better performing South Dakota varieties have been those with a relatively early maturity as opposed to a medium or medium-late maturity rating. Since the 1980s, the release of early maturity varieties along with early planting dates (April 1-21) have led to more consistent yields. In contrast, the use of late maturity varieties has often resulted in less consistent high yields.

### Seeding rates

The recommended seeding rate for spring wheat is approximately 1.2 million seeds per acre, or 28 seeds/ft<sup>2</sup>. This recommendation results in a final stand of about 1 million seedlings per acre or 23 plants/ft<sup>2</sup>. These 1.2 million seeds per acre can be delivered by using the specified PLS/foot-of-row values indicated for a “Firm seedbed” at 28 seeds/ft<sup>2</sup> in Table 5.2a. Should planting occur later, then the PLS/foot-of-row values for a “Late seeding” at 42 seeds/ft<sup>2</sup> is suggested. Seeding rates should be corrected for germination rates (Chapter 8).

A higher seeding rate for late-planted seeds is generally needed to compensate for the reduced number of tillers produced. The 28 seeds/ft<sup>2</sup> are based on recommended planting dates and good seedbed conditions. Remember, wheat is a cool-season crop and produces more tillers at cool to moderate temperatures than at higher temperatures. Therefore, the higher seeding rates will help compensate for reduced tillering.

Many growers prefer to plant bushels or pounds of seed per acre instead of using a planting density quantity like seeds/ft<sup>2</sup> or seeds per foot-of-row. In order to accommodate these growers, the density seeding rates in Table 5.2b have been converted to pound seeding rates. To convert the pound values in Table 5.2b to bushels, divide the number of pounds by the seed lot bushel weight to obtain the number of bushels in the seed lot.

Although many wheat growers measure seeding rates in bushels or pounds, it’s a good idea to verify the amount of seed being planted. Table 5.2c provides guidance on how to quantify seed delivery (number of seeds per foot-of-row). Included in the footnotes of Table 5.2c are two additional ways in which the table can be used to facilitate seeding plans or planting operations.

**Table 5.2a. The number of pure-live-seed (PLS) per foot-of-row required to deliver the recommended seeding rate depending on planting conditions and row space. In a given seed lot, PLS = germination % x purity %.**

Planting conditions	Drill row spacing - inches				
	6	7	7.5	8	10
<i>Recommended rates:</i>	----- PLS per foot-of-row-----				
Firm seedbed– 28 seeds/ft <sup>2</sup>	14	16	18	19	23
Late seeding– 42 seeds/ft <sup>2</sup> (50% increase)	21	25	26	28	35

**Table 5.2b. Spring wheat planting rates listed by seed size or seed count, and planting conditions that generally result in about one million seedlings per acre at emergence.**

Seed size by seed count	Planting conditions		
	Firm seedbed	Loose seedbed	Late seeding
	(28 PLS/ft <sup>2</sup> )	(35 PLS/ft <sup>2</sup> )	(42 PLS/ft <sup>2</sup> )
<i>No./lb</i>	----- PLS-lbs/A-----		
17,000	72	90	108
16,000	76	95	114
15,000	81	102	122
14,000	87	109	131
13,000	94	117	141
12,000	102	127	152

Calculations are based on 100% PLS and 90% emergence.

**Table 5.2c. The number of seeds per foot-of-row required to attain various seeding populations per acre using six row widths.** The blue values are populations of about 1.2 million seeds per acre.

Seeds per foot-of-row <sup>a</sup>	Row width - inches <sup>b</sup>					
	6.0	7.0	7.5	8.0	10	12
	----- Seeds per acre -----					
1	87,120	74,674	69,696	65,340	52,27	43,560
2	174,240	149,349	139,392	130,680	104,544	87,120
4	348,480	298,697	278,784	261,360	209,088	174,240
6	522,720	448,046	418,176	392,040	313,632	261,360
8	696,960	597,394	557,568	522,720	418,176	348,480
10	871,200	746,743	696,960	653,400	522,720	435,600
12	1,045,440	896,091	836,352	784,080	627,264	522,720
14	<b>1,219,680</b>	1,045,440	975,744	914,760	731,808	609,840
16	1,393,920	<b>1,194,789</b>	1,115,136	1,045,440	836,352	696,960
18	1,568,160	1,344,137	<b>1,254,528</b>	<b>1,176,120</b>	940,896	784,080
20	1,742,400	1,493,486	1,393,920	1,306,800	1,045,440	871,200
22	1,916,640	1,642,834	1,533,312	1,437,480	<b>1,149,984</b>	958,320
24	2,090,880	1,792,183	1,672,704	1,568,160	<b>1,254,528</b>	1,045,440
26	2,265,120	1,941,531	1,812,096	1,698,840	1,359,072	1,132,560
28	2,439,360	2,090,880	1,951,488	1,829,520	1,463,616	<b>1,219,680</b>
30	2,613,600	2,240,229	2,090,880	1,960,200	1,568,160	1,306,800
32	---	2,389,577	2,230,272	2,090,880	1,672,704	1,393,920
34	---	2,538,926	2,369,664	2,221,560	1,777,248	1,481,040
36	---	2,688,274	2,509,056	2,352,240	1,881,792	1,568,160

<sup>a</sup>If seeds per foot-of-row equals 1, the number of seeds per acre equals the number of linear feet-of-row per acre for that row width. For example, if row width equals 10, the linear feet-of-row per acre equals 52,272 feet.

<sup>b</sup>If row width equals 12, the number of seeds per acre for a given number of seeds per foot-of-row equals the number of seeds/ft<sup>2</sup>. For example, if seeds per acre equals 1,219,680, the number of seeds/ft<sup>2</sup> equals 28.

### Recent South Dakota spring wheat plant population research

The 1.2 million seeds/acre seeding rate recommendation was tested in research conducted in 2003, 2004, and 2010 at Warner and South Shore, South Dakota (Northeast Research Farm). Partial results from the 2010 spring wheat seeding rate study funded by the South Dakota Wheat Commission are shown in Figure 5.1. The yield averages from the 1.2 (1X) and 2.4 (2X) million seeds/acre seeding rates were similar. The yield averages from the 1.8 (1.5X) million seeds/acre seeding rates were lower than the 1X and 2X seeding rates. This lack of yield increase, considering the increased seeding rates in 2010, was similar to the results obtained in 2003 and 2004. The lack of yield increases with increasing population was attributed to a reduction in the number of heads/planted seed (Table 5.3). This suggests that higher seeding rates are not justified when using typical South Dakota cultivars that tiller. A higher seeding rate is needed when a 'low-tiller' variety is planted.

### Seeding depth

The recommended seeding depth for spring wheat is 1 to 2 inches. At depths less than one inch, there is a higher risk of poor seed-soil contact and poor emergence, especially when the seed bed is rough and/or dry. Spring wheat does not generally exhibit as much, if any, hypocotyl elongation compared to winter wheat, so there can be a danger of planting spring wheat too deep. It is strongly suggested that spring wheat should never be planted less than 1 inch or more than 3 inches deep.

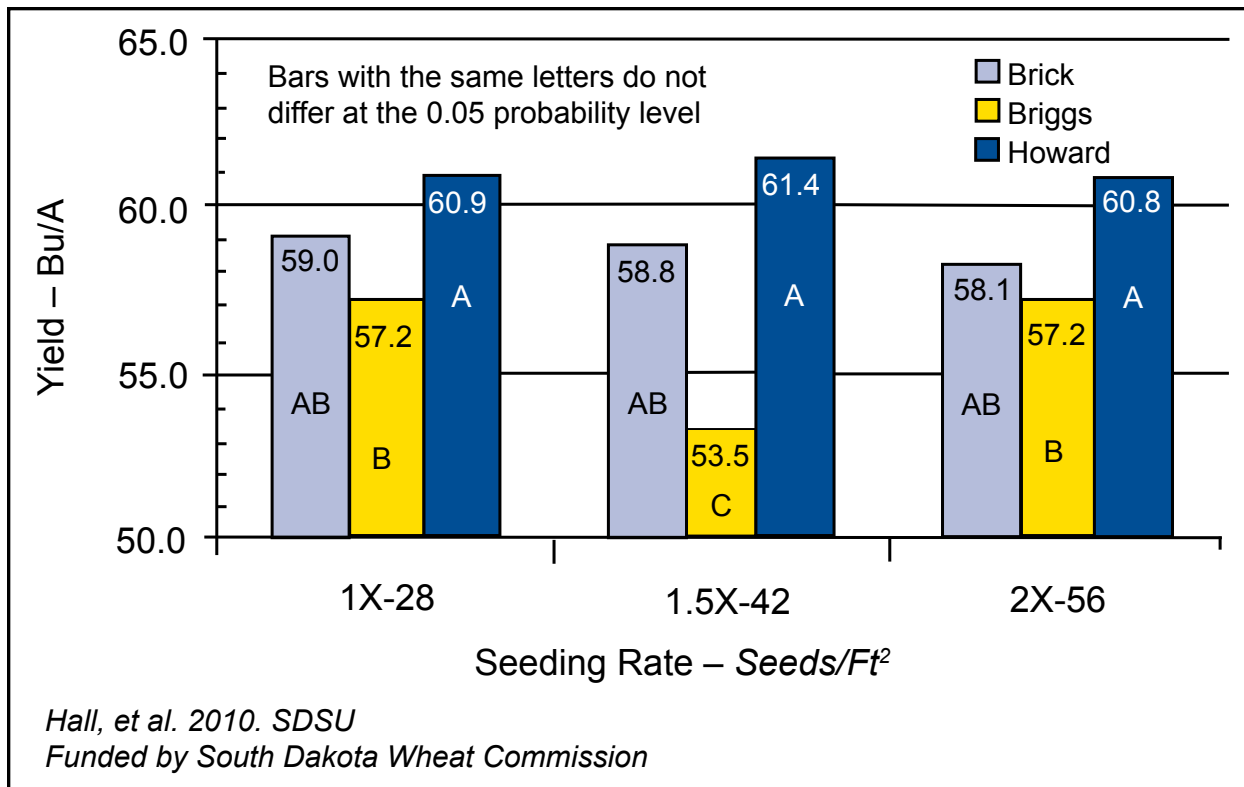


Figure 5.1. The spring wheat yield response to the significant variety x seeding rate interaction at Warner, SD (2010). Yield values followed by the same letter do not differ significantly at the 0.05 level of probability.

Table 5.3. The effect of plant population on the number of heads produced for each seed planted.

Planted populations	Brick	Briggs	Howard
<i>Million seeds/acre</i>	<i>----- Heads/seed planted -----</i>		
1.0	2.2	2.6	2.5
1.8	1.4	1.7	1.8
2.4	1.2	1.1	1.3

## Additional information and references

South Dakota field crops—planting to harvest. 1979. South Dakota Agricultural Statistics Service.

South Dakota—seeding to harvest. September 1995. South Dakota Agricultural Statistics Service.

Simmons, S.R., E.A. Oelke, and P.M. Anderson. 1995. Growth and development guide for spring wheat. University of Minnesota, WWW-F0-02547. Available at <http://www.extension.umn.edu/distribution/cropsystems/dc2547.html>

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Hall, R.G. 2012. Spring wheat planting guide. In Clay, D.E., C.G. Carlson, and K. Dalsted (eds). *iGrow Wheat: Best Management Practices for Wheat Production*. South Dakota State University, SDSU Extension, Brookings, SD.

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